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ORIGINAL ARTICLES.

CONCERNING SIDEROSIS BULBI.*

BY CHARLES J. KIPP, M. D., NEWARK.

The fact that eyes harboring fragments of iron do sometimes, after a varying length of time show discoloration of the iris, a brownish staining of the cornea, yellowish brown dots arranged in the form of a wreath under the capsule of the lens, brownish staining of the lens and cataract, has been known for a long time. v. Graefe (1) seems to have been the first to call attention to the yellowish brown spots in or under the anterior capsule of the lens in an eye, which according to the history of the case, had been struck by a fragment of a gun cap. The eye was enucleated and on examination a splinter of metal was found in its interior. Since then Leber (2), Samelsohn (3), Landmann (4), Vosius (5), E. v. Hippel (6), Eisenberg (7), Natanson (15), Barkan (16), and others have reported cases in which these rust spots were present, and in which fragments of iron were found in the eye.

The appropriate term Siderosis bulbi seems to have been first used by Bunge (8) in a paper giving his views as to the manner in which iron was disseminated in the eye.

Leber holds the view that the iron is dissolved by the carbonic

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acid of the tissue, the solution in this form of bicarbonate of iron is diffused through the tissue, and precipitated by the oxygen of the arteries in an insoluble form.

The most complete anatomical examination of cases of Siderosis bulbi has been made by E. v. Hippel; Bunge, and Bednarski (9) have also examined a number of eyes with siderosis of xenogenic origin.

My own interest in the subject was aroused by cases which I saw long before the sideroscope was invented and the Roentgen ray was made available for the location of foreign bodies in the eye. Since then I have been constantly on the lookout for such cases and it has been my fortune to see a good many of them.

I have seen a number of cases on which the cornea was stained brownish for some distance around a fragment of iron which had been lodged in it for weeks, but I have never seen staining of this membrane from iron located in the lens or deeper in the eye. Bunge has reported two cases of siderosis cornea. The fragment of iron was situated in the nasal ora serrata. Hirchberg (10) saw 2 1-2 years after a fragment of iron had entered the eye, a deposit of yellow dots on the posterior surface of the cornea. Praun (11) has reported a case in which a large splinter of iron had remained for a year in the center of the cornea causing a ring of rustbrown color 2 mm. in diameter which was surrounded by a somewhat lighter ring of 5 mm. in diameter.

The change in the color of the iris mentioned by other observers I have seen only in cases in which the yellowish brown dots arranged in the form of a wreath under the anterior capsules of the lens, were present at the same time. I have seen both a yellowish brown and a greenish yellow discoloration, but the first most frequently. The eyes showing this discoloration of the iris had in all my cases harbored the fragment of iron more than six months. I may say right here that in all of the cases on which these remarks are founded the fragment of iron was either extracted by means of the magnet or the iron was found in the enucleated eyeball. The discoloration of the iris due to xegoneous siderosis has been seen to disappear again and the original color restored after the removal of the iron (Hirschberg (12)), and even in cases in which the iron remained in the eye (Vossius (15)). In my own cases the discoloration remained in all cases after the extraction of the iron as long as they were under observation. It is well-known that a similar discolora-

tion of the iris follows extensive hemorrhage in the vitreous and some times in the anterior chamber and so far as I have been able to discover there is no difference whatever in the discoloration caused by either. Hirschberg thinks that the discoloration due to iron in the eye is permanent, while that caused by hemorrhage may disappear.

The change which I regard as of greatest practical importance, is the appearance of the yellowish brown spots under the capsule to which already repeated reference has been made. Anyone who has seen them will always recognize them thereafter. These spots are of a round form, less than 1-2 a mm. in diameter are of a yellowish brown color, and appear at regular intervals of about a mm. or two, in a circle, in or under the capsule of the lens, about midway between the anterior pole and equator of the lens. In addition to these spots there often are also spots on the anterior capsule, also of a yellowish brown color, but situated much nearer to the anterior pole—the remains of broken posterior synechiæ. The spots behind the capsule, are only seen after nearly ad maximum dilatation of the pupil. I have seen these spots repeated in eyes in which the lens was still transparent and in which the capsule had not been ruptured. In all the cases in which they were present the fragment of iron was found back of the lens. In former years, before we had the sideroscope I have repeatedly cut open the eye and extracted the fragments of iron by means of the small electro-magnet, on no other evidence of the presence of iron in the eye, than the spots here described. Even now I should not hesitate to proceed to operate, if both the Roentgen ray picture and the sideroscope failed to reveal the presence of iron in the eye, and the spots here described together with the discoloration of the iris were present.

The lenses in which these spots are seen are in most cases opaque as in the following case:

Case 1. F. D., 30 years of age was seen by me for the first time February 2, 1906. He came to have a cataract removed from left eye. I learned from him that two years ago he was struck on the left eye by a piece of iron; he did not think that the iron penetrated the eye as he had but little pain at the time, and his vision remained good for some time after the injury. He did not consult a surgeon about the injury as he considered it trifling. About six months after the injury his left eye became suddenly much inflamed, it was very red and somewhat painful and a few days later he noticed that the eye was

practically blind. The inflammation gradually passed away, but the vision has not improved. The examination showed the right eye to be perfectly normal in every respect. With a -0.5D. glass the vision was 6/5. The *left eye* was free from injection; the cornea was perfectly clear, no scar was visible in it or in the sclera; the anterior chamber was very shallow, the iris was discolored brownish (the iris of the other eye was blue). The pupil was of medium size and active; the lens was opaque and on its anterior capsule in its pupillary area were three dark brownish spots of irregular form. The pupil dilated readily ad maximum after the instillation of a one per cent. solution of sulphate of atropin. At the margin of the dilated pupil was now seen a wreath of yellowish brown round spots each about 0.5 in diameter. They were arranged at regular intervals of about 1.5 mm. and formed a complete ring. They were apparently situated in or under the capsule. The eye had perception of light only. From the appearance of the eye, I felt confident that it harbored a fragment of iron and advised the patient to go to the hospital where I would try to remove the fragment with the electro-magnet. This attempt was made on March 27, 1906, after the sideroscope had confirmed my suspicion of the presence of iron in the eye. It failed however to indicate the part of the eye in which the fragment was located. The eye was placed before the pole of the large or giant electro-magnet and kept there till the magnet got so hot that it was thought best to cut off the current for fear of destroying the apparatus. The magnet produced neither pain in the eye nor any change whatever in the appearance of the eye. Several other attempts lasting as long as the first one, were made on the next day but all with the same result. Although the eye was free from all symptoms of irritation, the patient fearing that the other eye would become sympathetically affected, I consented to enucleate the eye and did this under local anæsthesia on the following day. The wound healed in a few days and he was discharged on the sixth day after the operation.

Immediately after the enucleation I opened the eye and found the following condition. The iris was almost in contact with the cornea. The lens was much swollen and opaque and pushed the iris forward. The vitreous chamber was filled with a watery fluid. Of the vitreous body only a small quantity remained, it was condensed and extended from the ciliary process in the form of a strand to the retina between the equator and the

posterior pole in the temporal half; at this point was found a large foreign body, partly black, partly of color of iron rust and covered by a thick whitish membrane. On looking more closely at the beginning of the condensed remains of the vitreous body it was found to be adherent to the orbiculus ciliaris on the temporal side, where a long slit or opening in this structure could be distinctly seen. It was evidently at this point where the foreign body had entered and that the strand of vitreous represented the track of the iron. The foreign body was 7 to 8 mm. in length, about 4 mm. in width and 2 to 3 mm. in thickness. The major part was lying off the retina, but its inner end had penetrated the retina, the choroid and the sclera. The end of it was very sharp pointed and could be seen and felt on the outside of the sclera. The retina was evidently thickened throughout and of decidedly brownish color, the retinal vessels were unusually distinct and of an almost black hue. The papilla was flat but also brownish in color. Over the entire retina were strewn innumerable very minute elevations also of a dark color, they looked like very fine sand. I do not think that the retina was detached in any part when the globe was opened, but shortly after it had been placed in a solution of 3 per cent. formalin, I noticed several folds in it near the foreign body. I removed a part of the retina and placed it in a solution of ferro cyanide of potassium (2 per cent) and afterwards in weak hydrochloric acid. This treatment changed its color from brownish to a beautiful blue. Under a low power, the surface of the retina was found to be covered with dark blue minute elevations which were especially abundant on the sides of the vessels which also were of a blue color. The eye was then put in a 3 per cent solution of formalin. I may here mention that to convince myself that the foreign body was iron, I held the bottle containing the globe with the foreign body in it, at some distance from the pole of the large Haab electromagnet and that before one side of the bottle came in contact with the magnet the eye, which was at the other side of the bottle measuring about 3 inches across, began to move, toward the pole of the magnet and in a few seconds had reached the other side of the bottle. Later I held the globe itself within the cornea in front against the pole of the magnet for many minutes without producing the slightest movement in the foreign body. I submitted the globe for further micro-chemical examination to Dr. Dixon, whose report is as follows:

My Dear Dr. Kipp:

As you know, the eye was exceedingly brown—a shade not attributable to the presence of ordinary pigment, nor yet *ordinary* siderosis, hence I felt that the iron reaction should be very marked; but ordinarily applied it was not.

I send you four slides. The two stained after Van Gieson show the corneal epithelium intact; Bowman's membrane poorly marked; circumcorneal injection; a few wandering cells in the cornea propria; Descemet's membrane intact, and Schlemm's canal open.

The iris is rather densely pigmented, vessel walls somewhat thick, but otherwise normal.

The lens is in a condition of Morgagnian cataract well advanced, with pigment deposits under the anterior capsule.

The ciliary processes and body in good condition, but the choroid atrophied.

The retina is somewhat degenerated and the inner layers beginning with the external reticular layer loaded with pigment principally granular in character, particularly in the vicinity of the vessels, but a few chromatophores are to be seen.

The nerve and sclera appear to be normal, except that the latter presents collections of pigment in a few of the lymph spaces.

The other two sections are stained after Perl's method for iron reaction—Berlin blue. You will notice that one is very blue, and the other is a yellowish green. The first owes its color to prolonged action of the reagent, the other to the usual length of time. In the first specimen the iron appears to have been dissolved out and then reabsorbed, thus diffusely staining the entire section. The other was not allowed to remain in the reagent sufficiently long to set free so much Berlin blue, and hence is of a yellowish green color.

In these Berlin blue specimens you will find particles of iron somewhat diffusely located, no particular set of cells appearing to be implicated in the dissemination of the iron; for instance, the particles will be found in the lens substance and about the capsule, in the irisstroma, the cornea propria, in the retina, and the nerve, but not to the extent that would be anticipated from the brown discoloration of the different parts of the globe.

This dusky brown color appears to be due more to the deposit of haemosiderin than true siderosis. You will observe that some of the new formed retinal pigment reacts as iron, and some does not, which corresponds with the change which would be expected

to take place in deposits of haemosiderin—that is, after a time it is likely to fail to respond to tests for iron—further that it is principally granular, is in and about the blood vessels, is of a color entirely different from the neighboring autochthonous pigment, and is of the same character as the pigment under the anterior capsule of the lens.

I would further call attention to the fact that the greater part of the Berlin blue will be found on the surface of the specimens, showing that it has been washed out in considerable quantities and evidently came from the adventitious retinal pigment.

Very respectfully,

GEO. H. DIXON.

June 18th, 1906.

As I have already stated, I have seen the wreath of yellowish brown spots also in a few cases before the lens became cataractous, as the following cases show.

Case No. II. J. C., 27 years of age, consulted me for first time January 10. He stated that about a year ago his left eye was struck by a piece of steel, and that under treatment the eye had healed and had given him no trouble since. He came now because he had a severe pain over this eye. I found that the left eye was free from evidences of inflammation. The cornea was clear; the anterior chamber of normal dimensions; the aqueous was clear. The iris was discolored yellowish brown, (the other iris was brown;) the media perfectly clear. The optic papilla was very red. No disease of retina or choroid. No scar was visible outside or inside the eye. I have no notes of the vision of this eye at this time and I did not dilate the pupil. Under quinin the pain passed away in a few days.

The other eye was perfectly normal.

The patient was not seen again until August 10, six months after his first visit. He told me that since his visit to me, he had had many attacks of inflammation in the left eye for which he had been treated by well known ophthalmologists in another city. One of them had told him that he had a foreign body in his eye, while others equally experienced had advised him against enucleation, which the others had proposed. The eye was now blind. There was severe iritis, many posterior synechiae which were mostly broken up by instillation of atropin. In or under the anterior capsule was a wreath of yellowish brown small dots, placed at regular intervals on a line with the dilated pupil. The

lens was clear. The vitreous opaque. No re l reflex could be obtained. On the strength of the rust spots in the capsule, the discoloration of the iris and the condition of the vitreous together with the history of the case, I diagnosed the presence of a fragment of iron in the vitreous chamber or the membranes of the eye and asked the patient to let me try to extract it with the small electro magnet. His consent having been given, I made an incision through the coats of the eye, between the insertion of the tendons of the external rectus and inferior rectus muscles, and then introduced the tip of the magnet about 5 mm. in the vitreous chamber. I felt the well known click at once, and on withdrawing the magnet found the fragment of iron hanging to it. The fragment measured about 3 mm. in length and was very slender. The operation was not followed by any marked reaction. Later on he had an atropin conjunctivitis which subsided under sulphate of zinc solution. The eye was free from inflammation for about six months after the operation, then he had another attack of irido choroiditis. Since then I have not seen him.

Case No. III. J. B. D., 49 years of age, states that two days before he was struck on the right eye by a piece of metal. I found a linear wound about 2 mm. in length in the sclera, close to upper margin of cornea. There was not much injection of ocular conjunctiva; the cornea was clear; the anterior chamber of normal dimensions, the aqueous clear; the iris of normal appearance; pupil active, lens clear; the vitreous was very cloudy; the optic papilla seemed normal; in the upper part of the fundus was seen a white spot a little less than a disc's diameter in size and surrounded by an extensive extravasation of blood, apparently in retina. His vision was reduced to 6/10. As the eye gave him no pain he refused to enter hospital and was not seen again for eight months. At this second visit he told me that the injured eye had given him no pain and that vision had been good up to a month ago, when his sight failed rapidly. Last night he had much pain in the eye. The eye was now much injected around the cornea, which was clear. The iris was discolored brownish yellow (the iris of the other eye was brown); pupil was now dilated by atropin. In or under anterior capsule of lens was a wreath, a small round yellowish brown spot, at regular intervals about midway between center and periphery. The lens was clear. The vitreous was full of large floating opacities. The white spot in upper part of fundus was now surrounded by

a broad ring of pigment. No foreign body could be found. S. 5/24. Two days later I made an incision through sclera, choroid and retina between insertions of tendons of external rectus and inferior rectus muscles about 10 mm. back of corneal margin, and through this opening introduced the tip of a hand electro-magnet several times to various depths, but without bringing out a foreign body. The wound healed in a few days. S. 5/24 after the operation. A month after this operation the eye was free from injection and was painless. S. 5/24. Shortly after this last visit the eye became again painful and much inflamed, and vision failed rapidly. Seven weeks after the attempt at extraction with magnet, and ten months after the receipt of the injury, the eye was totally blind, and as the pain was very great I enucleated the eye. An examination of the eye made immediately after the enucleation showed the presence of a fragment of iron about 4 mm. in length and 1 m. thick, covered by a thin membrane on lower part of ciliary body.

I have seen spots of almost the same color as those due to the presence of iron, also arranged in a circle at the same place but situated on the capsule, in a case of interocular hemorrhage followed by severe irido cyclitis with haemorrhage in the anterior chamber.

Case No. IV. The case is that of a man 40 years of age who is otherwise in good health, denies having had syphilis, is of good habits and so far as I can find out is free from disease of any other organ. He came to me with the symptoms of a severe sero-plastic iritis of one eye. He told me that he had consulted an oculist for failing vision of this eye a month before and that the oculist had told him that no local application was required and had prescribed potassium iodide in 10 grain doses. A week later this eye began to pain him and he was induced to place himself under the treatment of a "magnetic" physician. As no improvement followed this treatment he came to me. I found the pupils bound down by many posterior synechiae, and the aqueous very turbid. Under leeches to the temple, instillation of sulphate of atropin and cocain solution, the posterior synechiae were broken up completely. The vitreous humor was found to be so opaque that the fundus could not be seen. A few days later, a clot of blood was seen in the lower part of the anterior chamber, and a few vessels entered the cornea from below. The clot was absorbed in a few days, but an opacity of the size of a pea has developed in the cornea adjoining lower margin; in this area of

opacity are several small dots of denser opacity. Used dionin solution (10 per cent.) once daily in addition to atropin. The globe is now white, but many fine precipitates are now seen on Descemet's membrane, especially in lower half. During the following two weeks, the deposit on Descemet's membrane became more dense and was seen in all but the uppermost quarter of the cornea. The pupil is widely dilated and he is entirely free from pain. Two and a half months after his first visit to me he had a relapse of the acute symptoms with another somewhat larger hemorrhage in the anterior chamber. He recovered from this attack in the course of two weeks. There is now in the lower part of the cornea, a dense opacity of a somewhat pyramidal shape, base downwards evidently on Descemet's membrane there are also a few discreet spots all over other parts of Descemet's membrane. The aqueous is perfectly clear. There is now a wreath of yellowish brown spots, at regular intervals, on the anterior capsule. They are of the size and color seen in eyes containing iron, but are somewhat irregular in outline, not perfectly round. They are connected by a thin thread like opacity. Their situation is on a plane corresponding to the edge of a pupil of medium size. The pupil is now so widely dilated that a ring of not more than 2 mm. in width of the iris is visible. There are other spots of a darker color near the center, the remains of the posterior synechias. The vitreous is still so apaque that no details of fundus can be made out.

The patient is a merchant, has never, so far as he knows, been anywhere where particles of iron were flying about, and it is seen that this eye has never sustained an accidental injury. I think we may safely assume that a haemorrhage in the vitreous body is accountable for its dense opacity.

From this case it is apparent that only on very close examination a differential diagnosis can be made.

These spots under the capsule were found only in connection with cataracts in all the recorded cases. Hirschberg says however, that he has seen them in lenses, the capsules of which had not been broken, and E. v. Hippel (14), who in previous papers stated that he had never seen them in other than cataractous lenses, in his last statement on this subject admits that they are also found in clear lenses. He says moreover, that he has never seen them except in eyes containing fragments of iron.

Among other symptoms of siderosis bulbi, Hirschberg (10) mentions the ochre color of adhesions between the iris and lens

capsule. I have also noticed the same, but have never attached much value to this particular color of posterior synechiae.

Spontaneous mydriasis in cases of siderosis bulbi was observed in four cases out of fourteen seen by Vossius (13), and his examination of the literature of this subject has revealed a few similar cases observed by Mayweg, Wingenroth and Hirschberg. He attributes the mydriasis to irritation of the fibres of the sympathetic nerve which supply the dilator of the iris. Following this mydriasis after a year he has observed a miosis which would not yield to the application of atropin. Atrophy of the musculature of the iris, is regarded as the cause of this condition. The mydriasis as well as the miosis must be a comparatively rare condition, as I do not remember to have seen it in any of my cases.

Spontaneous subluxation of the lens has also been observed by Vossius (13). Spontaneous resorbtion of the lens has been observed by both E. v. Hippel and Vossius. This I think is not a very rare event. I have seen this cataract disappear entirely leaving only the capsule, in a number of cases especially in young persons.

Torpor of the retina, concentric contraction of the visual field and defective color perception have been frequently observed in cases of siderosis bulbi by the writers already referred to.

E. v. Hippel (6), who has investigated the subject of siderosis exhaustively, by examining human eyes which contained fragments of iron and has studied the effect of iron placed in the anterior chamber and in the vitreous body of rabbits, and studied the effects of injections of blood in the anterior chamber and in the vitreous of rabbits, gives the following as the result of his investigations:

I. The iron reaction with ferro cyanide of potassium and hydrochloric acid succeeds without exception even in preparations which have been kept in Müller's fluid for years, if the action of the reagent is continuous for a sufficiently long period (12 — 24 hours).

A subsequent diffusion of the Berlin blue does not take place either in fresh preparations which are examined in acidulated water, nor in sections which with the avoidance of distilled water, are enclosed in Canada balsam in the usual manner. All the pigment which gives the iron reaction may be decolorized by exposing it to the action of hydrochloric acid for 24 hours.

II. The Berlin blue reactions give exactly the same results

as Quinkes' method with sulphur ammonium, but it is immeasurably more effective, inasmuch as it brings out very distinctly faint colorations in preparations which normally contain pigment.

III. There exists a true siderosis bulbi which may originate in a two-fold manner, firstly direct from the foreign body (xenogenous siderosis) and secondly from the blood (haematogenous siderosis). Siderosis consists of the deposit of oxide of iron combined with the organic substance in certain cell groups.

IV. The haemotogenous siderosis is entirely independent of haemotogenous pigment; on the other hand "Haemosideria" is a haemotogenous pigment to which split-off iron is adherent. The color of the same is not dependent on iron.

V. The siderosis appears predominantly in specific cell groups more particularly in the epithelium of the ciliary processes, the pars ciliaris retinae, the retina and the epithelium of the lens capsule. The siderosis of these parts may be a xenogenous or a haemotogenous. The possibility of a genuine siderosis cornea can not be absolutely denied; its occurrence has not, however, been positively proved. It is probable that the brownish discoloration is due to the deposit of haemosiderin.

VI. The "xenogenous siderosis" is produced in such a way that the iron is dissolved by the carbonic acid of the tissues, the solution is diffused and becomes fixed by entering into an insoluble combination with a substance in the protoplasm and becomes gradually oxidized in cell groups which have a specific affinity for the iron. The accumulation of these cells makes micro-chemical authentication possible (distant effect or indirect siderosis). The great concentration of the solution in the immediate neighborhood of the foreign body, is the cause of the great deposition of the iron in the form of an oxide at this place. In the haematogenous siderosis the iron becomes free in the dissolved state and is then subject to the same conditions as that derived from the foreign body.

VII. Neither the greenish nor the greenish brown nor the rust colored discoloration of the iris and the cornea enable us to say positively that a piece of iron is in the bulb, as the same discoloration may be produced by the coloring matter of the blood.

VIII. The characteristic wreath of brown spots beneath the capsule of the lens, in the presence of a foreign body in the

eye, is the result of the deposition of iron in circumscript collections of proliferating epithelial cells of the capsule.

IX. The introduction of a fragment of iron in the vitreous body is followed by a high degree of degeneration of the retina (Leber). The large peculiar granular cells which are seen in this condition, are derived largely from the pigment epithelium of the retina. The cells of the same have the faculty to proliferate upon certain irritations, to change their form and to actively wander.

X. Exactly the same alteration which the retina of the rabbit undergoes, may appear in the undetached retina of man.

XI. After injection of blood in the vitreous, detachment of the retina may occur (Pröbsting); in addition there appears in the retina degenerative changes which have great similarity to the degeneration in its first stage, produced by the introduction of a fragment of iron in the eye.

XII. Injection of blood in the vitreous following the evacuation of the anterior chamber may cause rupture of the lens capsule; a satisfactory explanation for this phenomenon is still wanting.

Bednarski (9), who has had the opportunity of examining eyes containing fragments of iron, could demonstrate the iron reaction of Perl, chiefly in the proliferating cells; the epithelial cells of the iris and ciliary body did not turn blue, and the epithelium of the retina showed only a partial reaction. His examination does not confirm the assertion of E. v. Hippel that the epithelial cells of the ciliary processes, the pars ciliaris retina and the retina as a whole, have a specific affinity for iron.

The question why the rust spots under the lens capsule are almost uniformly found in the same region and of the same form, has as yet not been satisfactorily answered.

Samelsohn's (3) view that the spots represent pores in the capsule through which the fluid containing the insoluble particles of iron passes out of the capsule and on which the iron is deposited, cannot be correct as no one has as yet seen such pores.

Another question which remains to be answered is, why do not all eyes containing fragments of iron give outward evidence of its presence. I have seen a number of eyes which had harbored a fragment of iron for more than six months, and I have very recently examined one in which according to the patient's statements, the fragment of iron had entered the globe twenty-

five years before I enucleated it and found the iron imbedded in a coating and resting on the retina, which showed none of the signs of siderosis. The thickness of the coating on the iron can have nothing to do with it as is shown by Case I. In this case a very thick layer covered the iron while in the eye in which the iron had been lodged for twenty-five years, the coating was so thin that the iron showed through it. The dimensions of the fragment were about the same.

The length of time intervening between the entrance of the foreign body and the first appearance of outward signs of siderosis seems to vary considerably. In all of my cases the iron had entered at least six months before I saw the patient. Natanson (15) has observed signs of siderosis as early as two months after the foreign body had entered the eye.

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(12) Hirschberg, Einfuehrung in die Augenheilkunde, 2te Haelfte, p. 131.

(13) Vossius, Bericht uber die 29ste Versammlung der Ophthalmologischen Gesellschaft, Heidelberg, 1901.

(14) Same as 13.

(15) Natanson, A. Bericht ueber die 31. Versammlung der Ophthalmologischen Gesellschaft, Heidelberg, 1903.

(16) Barkan, Ophthalmic Record, 1903, p. 115.

SOME REMARKS ON THE INSTRUMENTS USED IN OCULAR SURGERY.*

BY DR. E. LANDOLT.

Translated by Adolf Alt, M. D.

During one of my trips to America I had occasion to see a colleague perform one of the most delicate operations of our specialty without speculum and with one knife only. Our friend K. complimented him by saying:

"I admire the dexterity with which you overcome the difficulties which you put in your own way." While admiring him we smiled.

I confess that the terse remark of Mr. K. comes back to my memory when I see how certain instruments are daily employed in ocular surgery which are so fashioned that they uselessly complicate an operation, even a simple one, and more so when the operation itself is a complicated one.

In this talk I should like to review a certain number of these instruments, which by a simple modification would be made more appropriate for their use. But, before speaking of the form of the instruments, let us in few words consider how to manipulate them; for the former must necessarily be such as but to correspond to the second.

The organ on which we operate is so small, so sensitive, so motile, the operations which we perform are so minute, that the instruments as well as their manipulation demand a delicacy which is much greater than any other in the whole realm of surgery.

The straight or lance-shaped knives, the cystotomes, the curettes, the spatulæ and similar instruments must be held by the tips of three of our fingers only. Only the fingers, not the hand and much less the arm, must guide the instruments.

The reason for this is evident. The tip is the most sensitive part of our fingers. This sensibility allows us to hold our instrument with the greatest ease, and to appreciate precisely the resistence which it encounters, and the nature of the tissues with which it comes in contact.

*Archives d' Ophtalmologie, May, 1906.

Further, in holding the instrument simply with the tip of our fingers we are enabled to manipulate it in the easiest, quickest, surest and most delicate manner possible.

We give it all the movements and the changes in direction which we desire; we turn it around its axis and let it make a see-saw movement. In fact, the sawing movement, as, for instance, is necessary when making an incision with a narrow knife, is not done in the correct manner except by the extension and retraction of the fingers alone.

The same holds good for the lance-shaped knife and even more for an instrument, like the curette, which we introduce into the interior of the eye, often after the lens has escaped and when the vitreous body has no other support but its hyaloid membrane.

Here it is even too much to rest the instrument on the first and second phalanx of the index finger; nothing but the tips of the first three fingers must manipulate it and only a small part of the little finger must serve as a support for the hand.

Then it can be moved according to will to the right, to the left, forward, backward, upward, and downward; it can be made to turn around its axis, and all this with the greatest facility and without changing the position of the hand in the least.

In this way only can these instruments be introduced into the eye with the necessary delicacy, be passed under a conjunctival flap, be made to glide between the woundlips without making them gape, to smooth out the iris without injury, and to guide cataractous débris out of the anterior chamber.

This is impossible when, instead of being suspended, so to speak, between the tips of the first three fingers the instrument is squeezed between the second phalanx of the thumb, the first and second phalanges of the index and the least sensitive part of the third phalanx of the middle fingers. In this manner all delicacy of touch is lost, no fine movement is possible, for not the fingers, but the whole hand directs the instrument; and how many such a hand lies on the forehead of the patient, when only the little finger should rest lightly on it.

When the instruments are held and manipulated correctly the unforeseen movements of the patient's eye or head are but little to be feared; the instrument can be withdrawn rapidly enough to avoid any dangerous collision, or if after all, it should come in contact with a part of the eye it would rather slide between the fingers than wound the organ.

On the contrary, if the instrument is held with the whole

hand, it is difficult to avoid a collision, and if this happens, it may prove fatal.

The following pages are addressed only to correct operators or those who want to become such; others can find but little of interest in them.

A surgeon should always know, first, what he wants to do, and second, how he wants to do it; that is, he wants to think out the most rational, the most simple and easy method according to which to do an operation. We must direct the manufacturers, who are eager to take our advice rather than follow some model, made in a routine without any reason. We are the ones to know form of the instrument most appropriate for a certain purpose, and for the hand which is to use it; but we must acknowledge, that we do not think enough and not all of us are good mechanics.

I know well that we can, also, operate with badly constructed instruments. I have done it myself; but why should we increase the difficulties we have to overcome.

In order to manipulate an instrument with the greatest delicacy and certainty, the manipulation must, like the simple hold between the fingers, call for the least possible force.

THE FORCEPS.

The other day at my dentists', I took hold of a forceps, which lay on the table, at least 12 centimeters long and pretty heavy, and was astonished at the ease with which it opened and shut. I remarked about it and was told that this forceps was used to grasp fine gold leaf and to deposit it delicately in the tooth to be filled. The same morning I had occasion to make an iridectomy and I was struck by the resistance offered by my forceps, and yet, ought the iris not to be treated with the same regard as the gold leaf? And the strength which we have to employ to hold our iris forceps shut when we introduce it into the eye and when we grasp the iris and pull it out of it, destroys as much of the delicacy in moving our instrument, as of the fineness of touch.

What I said about the iris forceps holds good for all forceps, and especially for those used in operations on the ocular muscles. A forceps held, as it should be, between the tips of the index and middle fingers on the one, and the thumb on the other side, can be moved in every direction and manipulated with mathematical correctness when no force is needed to hold it closed, otherwise the sensibility of the fingers is lost and the muscles get stiff.

This point must not be neglected when, for instance, it is necessary to slide a forceps gently under a conjunctival flap and to enter it between the woundlips without injuring their edges, to advance it into the anterior chamber to the very place, we intend it to, without touching the iris and to grasp the latter near its margin and to pull it towards us with such delicacy that not the slightest reflex on the side of the patient is provoked.

What has just been said concerning an iridectomy, applies even more strongly to the extraction of a membrane.

I had the forceps with a hard spring at once replaced by those with a soft one, and am very well off with them.

I want the spring of the forceps very soft, but, it is understood by itself, that I want the branches firm and rigid. Flexible branches would ruin the precision and certainty for this instrument. This is easily seen when examining certain forceps, the extremities of which open instead of shutting when the branches are pressed.

Formerly the branches of the forceps were roughened and this produced a certain adhesion between the instrument and the fingers. Now we are furnished almost altogether with forceps with smooth branches which are very incommode. Why? Because they can be sterilized more easily; I have been answered. The ideas of manufacturers are sometimes very extraordinary. A few days ago one, and not the least important of them, told me verbatim: If I had to operate I should sterilize my cataract knives in the following manner: "I should have a few pieces of well sterilized linen; I should plunge the blade of the knife into boiling water and then rub it till it would shine again I guarantee you that not a microbe would be found adhering to the knife." Everyone should stick to what he knows. Let them give us forceps which do not slip from our hands; we will take care of sterilizing them.

Since we speak of forceps, I may be permitted to return to another point in the construction of fixation forceps, which I have often had occasion to prove.

Since with this instrument we approach but very rarely the point of fixation at a perpendicular line, the teeth which lie in the axis of the forceps, come in an oblique line to the object which they are to seize. Thus they cannot act as well as they should.

Long ago, therefore, I had my forceps made with the teeth placed obliquely to the branches, but perpendicular to the surface where they are to act. Such forceps with one tooth for two,

and two for three are made in three models of different strength. The most used and lightest I always employ in operations on the eye muscles, the shortest in enucleation to direct the eyeball with.

One more observation regarding forceps. As careful as we are usually in trying the point and cutting edge of our knives, we neglect too often to try the bite of our forceps. Their teeth get blunt much quicker than one should suppose. It is indispensable to examine them before sterilizing and to see whether their teeth are sufficiently sharp and close properly.

In order to remove sutures after the advancement of a muscle, or after a plastic or any operation, smooth but stiff forceps give better service than toothed ones.

THE NEEDLE HOLDER.

In our long practice we have had occasion to experiment with a number of kinds of needleholders.

They may be arranged in two categories, those which the effort of the hand alone holds closed and those armed with some mechanism affecting this closure. With the first kind the hand maintains the closure, with the other kind the needle is held firmly even if the hand does no longer hold the instrument.

The first have the advantage of being able to hold needles of any thickness, while the other, although of a certain elasticity and possessing several groves, may break a thick and let slip a thin needle.

On the other hand it is plain that the hand forced to hold the needleholder shut loses a good deal of its freedom of action, which it might wholly retail with a needleholder with an automatic closure. It is, also, very agreeable to receive from the assistant's hand a needle already mounted in a needleholder.

We have used for a long time a needleholder which we had Mr. Lüer make for us and which unites the advantages of both systems while being very easily cleaned, which is not the case with all needleholders with a mechanical closure.

It consists of two parts:

First, a forceps shaped like a strong dissecting forceps. One of the biting ends is covered with copper so as not to break the needles. One branch has in its middle part, between the bit and thin springing part which holds the holder open when at rest, a gradually progressing thickness when it comes near the end grasping the needle.

Second, a ring sliding on the forceps. The diameter of this ring is such that when it is pressed toward the bit of the forceps, the gradually increasing thickness of the branches makes it force the two biting surfaces closer and closer against each other and with increasing force. A button on this ring allows of its being shifted by the thumb of the hand holding the needleholder.

This instrument has the enormous advantage, that it enables us to grasp and gradually tighten the hold on needles of any thickness, and it is just as easy to release it by a simple movement of the thumb.

INSTRUMENTS WITH A HANDLE.

The handles of the lances, knives, cystotomes, curettes, loops, etc, for cataract extraction and iridectomy deserve, we think, more interest than is generally accorded them.

Concerning the material and the shape of the handle of our instruments, we submit altogether too humbly to the pleasure of the manufacturers.

But a few years ago these handles were made of ivory, an ideal material for this purpose. Its weight is just right; it is a poor conductor of heat; but its best quality, which raises it especially above metal, is its peculiar adhesiveness. Without really adhering to the fingers, the ivory does not slip on their surface and it is possible to hold an instrument with an ivory handle and to manipulate it in every way with the greatest ease, without any pressure, and without the risk of its slipping.

But, we have been told, O horrors, that such handles cannot stand the high temperatures, which sterilization demands, and a great many of us, with more or less resignation, have accepted metal handles. In general surgery where the knife is grasped and manipulated almost always by the whole hand the difference between a metal and an ivory handle is of little importance. For us, on the contrary, it is enormous. Above everything, a metal handle is to heavy. To reduce this, they have been made grooved or of aluminum. But even the grooved handles which we have tried, are too heavy and, worse still, they are unbalanced. If for instance a Graefe cataract knife with a metal handle is without much pressure held between the fingers, the handle goes down and the point rises up.

When we complained that the surface of the metal handles was too smooth, we have been triumphantly shown handles with

two opposite sides roughened. This really is making fun of us. We are not afraid that somebody will tear the instrument from our fingers, but we desire that without pressure it will hold sufficiently firm between our fingers, wherever we want to put them, whatever surface of the handle we want to grasp, for there are operations in which a certain rotation of the instrument between the fingers of the operator is necessary.

Some manufacturers have been quite successful in giving the surface of aluminum handles a certain rugosity which approaches that of ivory, but they have also told us that the aluminum is not always pure and may be altered by contact with certain antiseptic solutions.

Finally, nothing for the oculist can possibly replace the ivory handle. And is it really ivory which cannot withstand the heat of the sterilizer? First, what is temperature necessary for sterilization? 120 degrees in the sterilizer, 140 degrees in the dry oven. Ivory almost always can withstand this temperature for the time required to sterilize it. Only this must not be overreached, which would anyhow be useless.

What cannot even withstand a temperature of 120 degrees, is not the ivory, but the resinous cement which certain manufacturers use in order to fasten the blade in the ivory handle. This resin melts and the blade gets loose.

It seems that it should not be impossible to invent a cement which might withstand 140 degrees and behave like ivory. Or, as certain careful manufacturers do now, the blade can be screwed into the ivory handle, the ivory being not only furnished with the necessary hole, but even with a metal screw thread.

Metal and ivory do not dilate equally under the influence of heat, thus it can now and then happen that a handle splits, but this occurs rarely, if the heat is gradually increased and never goes beyond 140 degrees. Our experiments in this direction are absolutely convincing. And if once in a while a handle splits a little or even breaks altogether, what is the damage? How many handles do we lose, simply because they last longer than the blades they hold? Ivory is not such a costly material that we need to cry over a broken handle. On the contrary the perfection of our operations lies so much at heart that no sacrifice seems too great in order to realize it. In consequence we have remained true to the ivory handle for our most delicate instruments, while admitting aluminum for our bistouris, squirt-hooks and similar instruments.

In the interest of the equilibrium, aluminum handles must, however, be made somewhat shorter.

Having treated of the material, let us consider the shape of the handle. As a rule, the handles have a classical shape and dimensions, which answer well their end. The length is from 95 to 100 millimeters. The third nearest the blade is somewhat thicker. The cross-section represents a rectangle with cut off corners. The surface of the blade of the lances, like that of the catarac knives is parallel with the wider side of the rectangle, which is perfectly correct. For, whatever we may do with these two instruments, the tips of the thumb on the one and the tips of the index and middle fingers on the other side must find a surface large enough to prevent the instrument from turning around its axis against the wish of the operator. On the other hand the cut-off angles allow of such a movement should the operator desire it, as for instance, in order to change the plane of the wound in cataract extraction.

In instruments which must permit of a greater amount of rotation around their axis the cross-section of the handle is more like a square and the angles are cut away to a larger extent.

Such are the handles generally furnished by the good manufacturers, but we must avoid receiving them without control. It happens that they are too short, too thin and that the corners are too squarely rounded by which some of the ease of manipulation is lost. Their cross-section is sometimes rectangular instead of square. It also happens that the blade is at right angles to the wide sides at the rectangle instead of being parallel to them, which is a grave fault.

THE BLADES.

The blades of the cataract knives have been the object of such profound studies, followed by such precise indications, that everyone finds without trouble at the good manufacturers the blade which he prefers.

The straight and narrow blade of the linear von Graefe knife is and will certainly remain by far the most sought after. It is easy to handle and admirable for all purposes, especially when compared with the triangular knives. The reason that the linear knife is so admirable is that with it we can successively make the puncture, counterpuncture and section. On the contrary, when the point of a triangular knife reaches the

point opposite to its entrance, the cutting edge has already cut a great portion of the cornea and the section is finished almost at the same time as the counterpuncture is made. At any rate, the plane of the knive cannot be altered and the section is determined with the counterpuncture. This forces the operator to keep his attention at the same time on the point, back and cutting edge of the triangular knife. With the linear knife, however, more than one operator does not pay any attention to the place where the knife will come out of the anterior chamber until after the point has entered it. And when the counterpuncture is accomplished, he determines the height of the flap. Thanks to the narrowness of the knife he can, by tilting more or less, modify the section according to the smaller or larger extent of the base.

This facility with which at any moment the form of the section can be altered, wins the young surgeon and makes the linear knife so sympathetic. We must, however, not forget that every change in the plane of the blade brings with it a change in that of the incision and that an irregular wound heals less easily than a wound which follows a single plane. There is hardly any more occasion to see incisions made with Beer's knife. An incision made with the linear knife by a steady hand which has guided it in one and the same plane is exposed to few complications, it cicatrizes promptly and nicely; it is quite different with an incision made by an unsteady hand with the same instrument between the same points; puncture, counterpuncture and summit.

We see this fact daily when comparing the healing of two wounds for iridectomy of the same size, one made with the lance, the other with the linear knife. The former is always smoother than the latter. Yet, a great many young colleagues prefer even for incision of such a small size, the linear knife to the lance. Why? For the reason, just mentioned, the narrow knife seems to them to be infinitely easier to handle. With the lance attention must he paid at the same time to the point and the two cutting edges, because as the former penetrates into the anterior chamber, the two others form the wound. If the blade is tilted a little when compared with the meridian in which one operates, the wound is no longer parallel to the corneal margin. And when watching the latter the point may collide with the iris or the lens or take a course which badly changes the wound canal.

What way is there out of this dilemma? We must learn to

watch the course of the whole blade at once. Then we can make with the linear knife for the extraction of cataracts as smooth wounds as our elders did with the triangular knife and we will profit by all the advantages offered by the lance for smaller incisions.

Regarding the lance we may be permitted to introduce here to the colleagues who may not yet know it the shape which we insist on and which in long years of practice we have proven. The pretty strong shank of our lance instead of having an elbow is simply curved. Thus the power is exerted on the curved axis of the instrument. Furthermore, the blade of our lance is not simply triangular but rather has the shape of the ace of spades. The great advantage of this shape is the ease with which the lance penetrates the resistant tissue of the corneal margin. As soon as it has entered the anterior chamber the remainder of the blade follows without effort, if it is ever so large.

Our modification of the lance concerns, however, not the shape and the curvature of the blade alone. We have, also, considerably shortened it. Instead of 35 millimeters as it often is with ordinary lances, ours has only 22 millimeters. In fact if the little finger of the operator rests on the orbit, for reasons soon to be given the middle finger in order to be near enough to the blade is no longer on the handle but on the shank of the instrument, when this is of the usual length. This manner of holding the instrument is illogical even with the wide and flat shank of our lances. With the ordinary lances with their round and thin shank it may be harmful. With our lance all of the three fingers which guide the instrument are in contact with the handle.

What we have said of the shank of the lance applies with still greater force to other instruments, such as the curette, the spatula, but especially to the spoon of Pagenstecher, the loops of Taylor and Snellen. The idea which has produced them may be perfect, the aim persued excellent, but their execution allows of much to be wished for, and yet can be easily modified.

The curettes and spatulæ are generally used when the lens has escaped from the eye, when the vitreous body pressed forward is supported only by the hyaloid membrane; the spoon of Pagentecher, like the loop, is destined to glide behind the lens beyond its posterior pole and to extract it from the eye with as little injury to and loss of vitreous body as possible. That

means, that these operations are of the most delicate we have to perform, especially when the lens is dislocated. The dexterity of the operator does not suffice in such a perilous condition, the patient, also, must be perfectly quiet. And since we can never count on that, except under general anæsthesia, we must make sure that his movements do not interfere with the operation. This is possible only, when, with the little finger lightly placed on the orbital margin, our hand with the instrument held by it follows the movements of the head of the patient, or foreseeing a movement which is too risky, can withdraw to avoid the peril. If the operator's hand is not in contact with the patient's head, he risks at the least movement of the latter, a deviation of the instrument and the rupture of the vitreous body.*

I have here before me a Snellen loop, the shank of which does not measure less than 30 millimeters, a Pagenstecher spoon and a Taylor loop the shank of which is even 35 millimeters long.

Necessarily, when these instruments are held by their handle, the hand is too far from the patient's eye to get any support on his orbit and from the acting part of the instrument to be able to direct it with the security demanded.

If, in order to avoid these inconveniences, we should try to grasp the instrument nearer its end, the thin and cylindric shank would be applied at the tip of the middle finger and might turn around its axis. Furthermore, the instrument being seized thus, its point of gravity would be outside of the fingers and this would be another cause of insecurity in its use.

The same is the case with the curette and spatulæ.

Let us reduce the shank of all instruments in length, so that we can easily lay the little finger on the orbit of the patient while holding the instrument by its handle. It will sometimes be necessary to do away with the little swelling on the shank which is

***The question of the benefit of such a slight rest on the orbital margin of the patient has interested me very much. Luellen, the father, the most perfect operator I know of, and under whose direction I had the privilege to operate in 1902 to 1903 at Utrecht, said to me more than once: "Your hand is so steady that you should not make use of the slightest support while operating." This is probably the only one of the good counsels of this master which I have not followed. I find that the contact with the patient gives such a feeling of security that it would be wrong to sacrifice it to the elegance of the operation.**

The only, but very great advantage, which de Wecker's iridectomy scissors possess over ordinary ones, is precisely because they allow of this support.

absolutely useless, but which certain manufacturers seem to cling to from an æsthetic view.

THE BISTOURIS.

The bistouris which we use to make plastic operations, are naturally very much the same as those of the general surgeon, except that we prefer smaller models on account of the limited territory on which we operate and the shorter curves which we have to describe. Here, also, it is desirable that the shank of the instrument is shorter than that of most bistouris, even those of average dimensions. This is especially true of the little bistouris which we use for instance, for the operation of a chalazion. The nearer the tip of the fingers is to the end of the blade, the greater the precision and the force of the incision. Here, also, we can to advantage support the little finger. We use bistouris with a straight blade close to the tip of the finger and they work admirably.

I may here mention a small blade which gives excellent service in transplanting the ciliary border. It is similar to Priestley Smith's iridectomy knife only the shank is much stronger and the blade much shorter. I use it to detach the ciliary border with all the lashes in its whole thickness to the anterior edge of the tarsus. After that the skin of the lid is freed by another knife.

There is another blade which deserves mention, that of the Weber's knife. This nearly always ends with a curved little blunt button. Why curve it since it is meant to make the introduction of the knife into the canaliculus easier and to guide it to the entrance into the lacrinial sac? Did the first one who gave it this form think that the canaliculus before running parallel with the lid margin, runs for a little ways at right angles to it and did he try to follow this out with his instrument? In that case, he should have directed the extremity of the knife in the directly opposite direction, because the blade must cut the wall opposite to the direction of the button. The simplest is to leave the end of the Weber knife perfectly straight, so that it is simply the prolongation of the back. In fact, the elbow of the canaliculus disappears almost completely when the lid is stretched to incise it and, anyhow, it is quite easy to introduce a straight knife.

Since we speak of the lacrimal pasages, I may be permitted to insist on the shape of our probes which leaves much to be desired. If we look at the catalogues of the manufacturers of in-

struments and ask for a Bowman probe without special specification, we will get a single shaft cut perpendicularly to its axis, the edges of the extremities barely a little blunt.

This form of the tips of the probe is absolutely to be condemned. Such a probe does not only find it difficult to enter the canaliculus, but is in danger of catching in the folds in the nasal duct, and of tearing the mucosa and of increasing the existing lesions.

The tip of the Bowman probe must have the form of a small olive a little drawn out at the end and united to the body of the probe by a part a little thinner than the latter. In this form it enters easiest into the canaliculus, and finds its way without trouble and without causing any trauma to the end of the nasal duct.

We avoid as much as possible cutting a lacrimal canal and we succeed in most cases in curing the lacrimation, the mucocele, even the suppuration of the sac when not complicated by necrosis, by respecting the integrity of the canals. Yet, it is often necessary to dilate the canal slightly to make the introduction of the probe easier. But, instead of using the conical probe furnished separately by the dealers, since oculists have used it for a century, we have united in one and the same instrument the conical probe and No. 1 of Bowman, so that after the dilatation we simply turn the instrument between the fingers without releasing the lid or changing the position of the hand.

An instrument for which it is especially necessary to reduce the distance between the finger tips and the active extremity is the galvanocauter. Here certainty and precision of the manipulation is the less indispensable since the instrument acts at a simple touch and because in most instances this action must be limited to a determined area, to the least possible depth and to a very short period of time. How can one arrive at this indispensable precision in the execution of such a delicate operation, when the red point of the cauter is several centimeters from the tip of the fingers and the hand far from the patient's head?

I have had a galvanocauter made by Mr. Francois which I always use with great satisfaction. It is cylindrical and composed of a nickeled tube, 4 millimeters in diameter in which is fastened an isolated shank for the return current. To one end the platinum tip is soldered and the other is made to fasten on the handle of the cauter by friction.

This is made of ebonite and also cylindric. It has a diameter

of 12 millimeters and can be manipulated with the greatest ease.

At one of its ends it has a bipolar concentric rim which is split and springy, in which by simple friction the cauters are held; at the other end is fastened the wire connecting with the source of electricity. An interruptor button placed as close as possible to the upper end of the handle, permits closing or breaking the circuit at will. Aside from the ease of manipulation, the whole offers this advantage that the cautery tips can be easily changed without having to turn a screw.

THE SCISSORS.

In 1883 in an article on an instrument case I said that the scissors furnished us by the manufacturers show reminiscences of general surgery. In general they, like the bistoris, are too voluminous, often even too coarse. The scissors which the dealers sell for enucleation, could serve to sever at one stroke the collum uteri and their squint scissors could be used for enucleation. By handling the scissors properly we can do away with these monsters and accomplish with a small pair any kind of an operation in the surest and easiest manner.

But the principles of surgery are here, also, but rarely observed. The illustrations in more than one treatise show, that even those who pretend to teach, are not all familiar with the correct handling of the instrument.

In order to be easily handled the scissors must be above all, of dimensions which correspond with those of the hand, which is to employ them.

Then, it is necessary to hold them according to the rules between the tips of the first four fingers. The ring finger and thumb engage their first phalanx in each of the rings so as to be able to open and shut the scissors by spreading and coming together. The index naturally curved lies on the joint of the blades; the tip of the middle finger rests on the side on the corresponding ring and blade.

Grasped in this manner the scissors are held laterally by the thumb and ring finger, above by the index finger and below by the middle finger. They cannot slip in any direction and are manipulated with the greatest ease.

This manner of holding the scissors has the further great advantage that by the fourfold contact with the most sensitive part of our fingers, far from being simply a kind of cutting

forceps, they become the most sensitive probe. They can inform us about the nature of the tissue with which they come in contact and about the precise place where their points are. Finally, since our index finger is as near as possible to the acting extremity of our instrument, the manipulation of the latter gains in precision.

As we have said, in order to have all these advantages, the scissors must necessarily correspond with the hand of the operator; with the hand half open, the thumb and ring finger must be engaged in the rings, and the tip of the index finger must fall just on the joint. In most cases the branches are too long and when the operator has a small or even middle sized hand he must stretch out the index finger. This somewhat forced position of the hand detracts from the use of its movements . . . . . .

In many scissors, especially those which the dealers call squint scissors, the blades are too long. Except in plastic operation we seldom make a cut which is longer than 11 millimeters and we generally make use only of the points of the scissors. . . .

The dealers furnished us too often with scissors the cutting edge near the point of which leave much to be desired. Yet there are many operations in which just this part alone is used, as, for instance, in enlarging a corneal incision and when simply removing some sutures.

Many times the scissors have uselessly sharp points. The points should be carefully rounded off. The manufacturer can thus the better make them cut sharply to their very extremity.

We like the branches of the scissors strong, and absolutely solid, that is the sides touching each other broad and flat, so that the play of the blades is well regulated. The blades we prefer thin, except in enucleation scissors where they can be somewhat stronger.

Our scissors for enucleation are curved in two ways on the flat and on the cutting surface. Thanks to this latter curvature they can be guided very easily along the corneal margin to quickly detach the conjunctiva, then under the muscles to cut them at their insertion. Thanks to the curvature on the flat they hug the globe so as to cut all adhesions and the optic nerve. It is well to have two pairs of such scissors with the curvature on the flat in opposite directions.

The old fastening of the scissors by means of a screw has generally given way to another form which permits of an easy detachment of the branches for cleaning.

Yet, the screw had its good sides in that it always held the blades as tightly, as a good function requires. This is not the case when the two branches are simply held together by a button fastened to one and introduced into a groove in the other.

The manner of articulation of Collin is much superior. Here one branch has a little cylindrical projection which with mathematical precision fits into a hole in the other branch. Thus the scissors can be put together and taken apart in a second.

The juxtaposition of the branches is, furthermore, assured by a piece, "the finger," as the inventor calls it, which holds one blade against the other. It is well, of course, to see after every sharpening that they work well. If the blades have become loose, they are easily pressed together by "the finger" which holds the handle.

To test the scissors, especially their cutting edge near the point, is as necessary as to test the cataract knives. And, if we watch carefully that the working part of our instrument is irreproachable, why should we be careless or indulgent as concerns their general construction? Should they not, in short, form a part of our hand, the prolongation and perfectioning of our fingers?

There is no doubt, that in taking better into account the use to which we put our instruments, we can give to majority and especially to the most important ones a more appropriate shape, and in conforming more with the classical rules of ocular surgery, which rules are the results of long and intelligent experience, that we will operate with more satisfaction to ourselves and usefulness to our patients.

Before antiseptic times, when the surgeon with touching innocence sought the explanation of each failure in a fault of the operative procedure, he strove to carry this method to an absolute perfection. To-day, when—shall we say happily or unhappily—asepsis often brings about a relatively happy ending to a very badly performed operation, to-day we neglect the operative manipulation too much.

It is, however, evident and easy to prove that the results obtained by a correct operator are superior not only in quantity, but also in quality to those of an incorrect and awkward operator.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

At a clinical evening on February 8th, Mr. Charles J. Oldham, Vice-President, in the chair, the following were among the exhibits: Messrs. Arnold Lawson and George Coats: preparations from a case of *Congenital anterior staphyloma,* previously brought before the Society by Mr. Lawson. The eye had spontaneously ruptured six weeks later. The central portion of the cornea was thinned and had a cicatricial appearance. There was a perforation, with a knuckle of retina between its lips. The lens capsule and iris were adherent to the back of the cornea. Owing to stretching the ciliary processes, pars plana, ora serrata, and anterior part of the choroid were carried forwards with the cornea. Owing to the firmer attachment of the ciliary body to the sclera, this had been left in its normal position. Thus the ciliary processes were further forward than the termination of Descemet's membrane, the pars plana was opposite the ligamentum pectinatum, and the ore serrata were actually in front of the ciliary muscle. Only one other case of the kind had been described, also in a case of congenital anterior staphyloma. The displacement was due to the fact that in fetal life the inner layers of the uvea were less intimately connected with the outer than was the case after birth; the same occurred in many of the lower animals, especially in birds. The staphyloma in this case was believed to be certainly due to intrauterine inflammation and perforation.

Mr. Holmes Splicer: (1) a patient, aged 48, who had always had *Myopia.* The left eye had been blind ever since an injury which occurred thirty years ago, and the right eye failed in 1901, and, when seen there was total posterior synechiae and no P.L. The left eye had a corneal opacity and a tremulous iris, the lens was tilted and slightly dislocated backwards. It was quite opaque, and no fundus reflex was to be obtained. V = P.L. with good projection. On March 3rd, 1903, a needle was introduced behind the ciliary body, and the lens was pushed backwards. Sight was at once obtained, and it had since improved. The vision was now about $^{6}/_{60}$. There was a large area of myopic atrophy of the choroid about the disc, and the shrunken lens was visible at the bottom of the vitreous. (2) A case of *Superficial punctate calcareous deposit* on the cornea. The patient was a girl, aged 16. Her right eye was attacked by interstitial keratitis in June,

1897. She became deaf in 1902, and had an attack of interstitial keratitis in the left eye in 1905. This latter was severe, and led to much opacity, and to the development of salmon patches in two places, and a deposit of keratitis punctata at the back of the cornea. The left cornea had now cleared considerably; there was some deep opacity near the center, and numerous small light brown or dirty white dots exactly like keratitis punctata, but they were evidently close to the surface, and in front of the old interstitial opacity.

Mr. Ludford Cooper: a girl, aged 11, suffering from *Elephantiasis neuromatosis.* There was much deformity of the right upper eyelid and temporal region. The lid was pendulous and greatly hypertrophied in all its structures. The lid was considerably everted. The patient was unable to raise it, and it could only be lifted with difficulty so that the small shrunken globe beneath it could be seen. The lens was opaque and the tension normal. The outer and lower portions of the frontal bone and of the squamous portion of the temporal bone were much more prominent on the affected side. The condition was slowly increasing and was congenital.

Mr. E. E. Henderson:: a woman, aged 29, who had a *growth on the upper palpebral conjunctiva.* For several weeks she had noticed something movable beneath her upper lid, and for three days it had protruded. An oval mass was found, about 2.5 cm. long and 1 cm. broad. Its surface was smooth and vascular, and was attached to the fornix by an elongated strip of conjunctiva containing vessels.

Mr. Sydney Stephenson:: a boy, aged 9 years, who had a *double detachment of the retina,* one at the upper part and one below. The tension was increased and the vision was bare P.L. Transillumination showed that light passed readily through both detachments. The other eye was myopic with some vitreous opacities. There was an obscure history of injury and a doubtful family history of tubercle. The question was one of diagnosis. Mr. Stephenson was inclined to think it was tuberculous.

Mr. H. H. B. Cunningham: a girl, aged 5, whose sight was noticed to be defective at school. In both eyes there was a *semilunar gap in the lens,* at the lower part, more marked in the right eye; the suspensory ligament was here absent. There was no coloboma of either iris or choroid. The right eye was myopic, about 8 D, and the left about 3 D, but with astigmatism in both.